Analysis III for Engineering Students
Work Sheet 6

Exercise 1:

Compute the following integrals:

a) $\displaystyle\int_0^1 \int_0^2 (2x + y)^2 \, dy \, dx$,

b) $\displaystyle\int_R \frac{1}{xy^2 + x} \, d(x, y)$ with $R = [1, 2] \times [0, 1]$,

c) $\displaystyle\int_Q \cos y + y\sqrt{x + z} \, d(x, y, z)$ with $Q = [0, 2] \times [0, \pi] \times [1, 2]$.

Exercise 2:

a) Draw the closed area K given by $x \leq 0$, $y \leq 0$, $0 \leq z$ and $x^2 + y^2 + z^2 = 9$ and represent it as a "normal" area.

b) Compute $\displaystyle\int_K 8yz \, d(x, y, z)$.

Exercise 3:

Given a rotational paraboloid P by $x^2 + y^2 \leq 4$ and $0 \leq z \leq 4 - x^2 - y^2$. P has a constant density ρ.

a) Plot P using the MATLAB-function 'ezgraph3'.

b) For P compute the mass and moment of inertia with respect to the z axis.

c) Compute the moment of inertia of P with respect to the axis D, parallel to the z axis, passing through the point $(1, 1, 5)^T$.

Discussion: 16.1. - 20.1.2023